

What is claimed is:

1. A flow control device for an implantable pump, the flow control device comprising:

a) a reservoir for containing a pressurized supply of drug and a valve in fluid communication with the reservoir, the valve adapted to assume two flow states;

b) a control module for generating a control signal to the valve to thereby cause the valve to assume one of the two flow states, the control module duty cycling the valve to achieve a desired average flow rate over time; and

c) a bolus delivery component in fluid communication with the reservoir for metering and delivering a predetermined amount of drug bolus, the bolus delivery component further comprising an inlet valve, an accumulator, and an outlet valve, the bolus delivery component in parallel communication with the valve.

2. The flow control device of claim 1, further comprising a flow restrictor in fluid communication with the valve.

3. The flow control device of claim 1, wherein the valve is selected from the group consisting of: micromachined bi-stable valves, solenoid valves, piezoelectric operated valves and shape memory alloy actuated valves.

4. The flow control device of claim 1, wherein the two flow states comprise an open state, permitting flow through the valve, and a closed state, preventing flow through the valve.

5. The flow control device of claim 1, wherein the valve is a bi-stable valve.

6. A flow control device for an implantable pump, the flow control device comprising:

a) a reservoir for containing a pressurized supply of drug and a valve in fluid communication with the reservoir, the valve being adapted to selectively permit flow of drug at two predetermined rates;

b) a control module for generating a control signal to cause the valve to cycle between the two predetermined rates to achieve a desired average flow rate; and

c) a bolus delivery component in fluid communication with the reservoir for metering and delivering a predetermined amount of drug bolus, the bolus delivery component further comprising an inlet valve, an accumulator, and an outlet valve, the bolus delivery component in parallel communication with the valve.

7. The flow control device of claim 6, further comprising a flow restrictor in fluid communication with the valve.

8. The flow control device of claim 6, wherein the valve is a micromachined element.

9. The flow control device of claim 6, wherein the two flow states comprise an open state, permitting flow through the valve, and a closed state, preventing flow through the valve.

10. The flow control device of claim 6, wherein the valve is a bi-stable valve.

11. A flow control device for an implantable pump, the flow control device comprising:

a) a reservoir for containing a pressurized supply of drug and a flow control assembly for providing a normal dosage flow rate of drug from the reservoir to a patient, the flow control assembly including a valve in fluid communication with the reservoir and a restrictor in fluid communication with the valve; and

b) a bolus delivery component for metering and delivering a predetermined amount of drug bolus in addition to the normal dosage, the bolus delivery component further comprising an inlet valve, an accumulator, and an outlet valve, the bolus delivery device in parallel communication with the flow control assembly.

12. The flow control device of claim 11, wherein the bolus delivery device comprises an accumulator for accumulating a bolus of drug, an inlet valve for selectively permitting ingress of drug to the accumulator, and an outlet valve for selectively permitting egress of accumulated drug from the accumulator.

13. The flow control device of claim 12, further comprising a control module for providing respective control signals to the inlet valve and the outlet valve to permit accumulation of the drug and egress of the accumulated drug.